

# ANNEX B

to Decision No 09/2026 of the System Pillar Steering Group, 23 October 2026

## CONEMP Deliverable 5 - Safety Risk Analysis, System Level 4

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### Applicability

Deliverable 5 is applicable to trackside systems only. It is not applicable to on-board systems.

### Status

Deliverable 5 is the safety risk analysis at System Level 4. The safety risk analysis at System Level 5 cannot be considered final as long as the Service Function Configuration specification continues to be developed, and is continued together with that specification in SC 2.7.

### Note

This annex reproduces the document "Transversal CCS - System definition - SL4 - Risk Analysis", revision 982135, as approved on 30 September 2026. The document itself is unchanged.

Where the Train CS domain is named as an addressee of an exported constraint in section 3.2 of the document, the constraint is listed for the completeness of the analysis. It does not constitute a safety-related application condition for on-board systems.

# Transversal CCS - System definition - SL4 - Risk Analysis

## Review description

|                  |                                                                                                                                                           |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments         |                                                                                                                                                           |
| Approvals        | Soltaniehha Maha (I-NAT-BST-DEV-ENG1) : Approved , Nico Huurman : Waiting , RIVIE RE SYLVIE (SNCF VOYAGEURS) : Approved , Karl-Albrecht Klinge : Approved |
| Type of Approval |  Document Review                                                         |
| Attachments      |                                                                                                                                                           |

## Approval description

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Comments         | <b>#1 Approval comment</b> by <b>Nico Huurman</b> on 2026-09-30 11:58<br>Document refers to  <b>TCCS System Definition</b> as basis of the risk analysis. The  <b>TCCS System Definition</b> is not yet final, which means alignment changes in the Transversal CCS - System definition - SL4 - Risk Analysis may be needed at a later stage. |
| Approvals        | Ralph R Müller : Waiting , Roethel, Anton (SMO SDT TEC SPA PEX) : Approved , RIVIERE SYLVIE (SNCF VOYAGEURS) : Approved , Soltaniehha Maha (I-NAT-BST-DEV-ENG1) : Approved , Nico Huurman : Approved , GAVEL Antoine (SNCF RESEAU / Directions Techniques Réseau / DGII DTR GE SF PTI) : Approved , SCHWAN Nico : Approved                                                                                                                                                                                            |
| Type of Approval |  Document Approval                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Attachments      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|             |                                                                                                                                                                                                                                                 |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Abstract    | FMEA for Transversal CCS based on System Definition (System Level 4)                                                                                                                                                                            |
| Config Item | System PRAMS Risk Assessment Report                                                                                                                                                                                                             |
| Document ID | 02 TCCS Working documents/Transversal CCS - System definition - SL4 - Risk Analysis#982135  <b>Transversal CCS - System definition - SL4 - Risk Analysis</b> |

|                  |                            |
|------------------|----------------------------|
| Classification   | Public                     |
| Status           | In Review by System Pillar |
| Version          | 1.1                        |
| Revision         | 982135                     |
| Last Change Date | 2026-10-02                 |

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| Version & Date | Comment | Status |
|----------------|---------|--------|
|----------------|---------|--------|

| Version & Date  | Comment | Status                                              |
|-----------------|---------|-----------------------------------------------------|
| 1.0, 2026-09-25 |         | Reviewed version including findings from review 1.0 |
| 1.1, 2026-09-29 |         | Reviewed version including findings from review 1.0 |

## 1 Preamble

### 1.1 Methodology

The risk analysis is done by a FMEA (Failure modes and effect analysis) to identify safety relevance of the CCS System and to define mitigation measures to mitigate hazards.

There are three general failure modes (commission, omission, incorrect) analysed per exchange. The effects are split into describing the immediate effect on the linked function and the effect on the railway system as a whole.

The analysis of the output exchanges of the physical environment, external systems and human actors to the CCS System is structured by the corresponding System Actors.

This document contains all the exchanges that are analysed in a FMEA (see Risk Sheet link above), the assumptions taken into account and the requirements/constraints defined to mitigate the identified risks.

The link to the Risk Sheet of this analysis can be used to see the full FMEA in the corresponding template: [FMEA - Transversal CCS - SL4](https://polarion.rail-research.europa.eu/polarion/#/project/SPRM/risksheet?document=02%20TCCS%20Working%20documents%2FTransversal%20CCS%20-%20System%20definition%20-%20SL4%20-%20Risk%20Analysis) (<https://polarion.rail-research.europa.eu/polarion/#/project/SPRM/risksheet?document=02%20TCCS%20Working%20documents%2FTransversal%20CCS%20-%20System%20definition%20-%20SL4%20-%20Risk%20Analysis>).

### 1.2 Scope and intended audience

The scope of this FMEA is the inputs and outputs of the Transversal CCS system, as defined in the [TCCS System Definition](https://polarion.rail-research.europa.eu/polarion/#/project/SPT2TS/wiki/System%20Level%204/TCCS_System_Definition) ([https://polarion.rail-research.europa.eu/polarion/#/project/SPT2TS/wiki/System%20Level%204/TCCS\\_System\\_Definition](https://polarion.rail-research.europa.eu/polarion/#/project/SPT2TS/wiki/System%20Level%204/TCCS_System_Definition)). The inputs are taken into account and will be updated with outputs from other domains, such as Traffic CS and Train CS. This analysis is meant to be reviewed from all domains designing functions with inputs and/or outputs to Transversal CCS System.

This risk analysis also includes relevant non-safety requirements related to PRAM analysis and review, although they are only part of the complete PRAM requirements for the CONEMP domain.

The following domains are meant to approve this risk analysis:

- CONEMP

- PRAMS
- Train CS
- Traffic CS
- Trackside Assets CS
- Operational Design

The two main functions allocated to the Transversal CCS System are :

-  SPMS-2834 - [Maintain configuration data](#): simplified as "**TCCS Configuration**" here
-  SPMS-4502 - [Monitor+Evaluate system asset state](#): simplified as "**TCCS Diagnostics**" here

The Transversal CCS System also needs to synchronise time with a time reference to perform its functions, hence another function is allocated:

-  SPMS-2922 - [Synchronise current time](#): simplified as "**TCCS time synchronisation**" here

## 2 Detailed Failure Modes and Effects Analysis

### 2.1 Assumptions

**This risk analysis takes into account the following assumptions:**

#### **Safe Operation does not rely on performance of configuration interface**

Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the System under Consideration (lower speed/unavailability of area/etc).

#### **Safe Operation does not rely on diagnostics**

Any failure a **safe** system detects shall be handled without impacting the safety of the whole railway system. Thus, TCCS Diagnostics function is considered non-safety related.

## 2.2 Analysis of outputs & inputs of the TCCS System

### 2.2.1 Train CS

#### 2.2.1.1 Inputs for diagnostics

##### Input from Train CS System to TCCS Diagnostics: monitoring and diagnostic data received too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1621                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Failure Description                | Monitoring/diagnostic data is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Effect on Linked Functions Systems | No effect, as long as the state given corresponds to the current time (see incorrect failure mode if not).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Linked Work Items                  | <p>relates to :  <a href="#">SPMS-6884 - Monitor+Store Train CS System asset state</a></p> <p>relates to :  <a href="#">SPMS-6909 - Monitoring and diagnostic data</a></p> <p>relates to :  <a href="#">SPMS-6663 - Perform system asset diagnosis</a></p> <p>has parent :  <a href="#">SPRM-3194 - Inputs for diagnostics</a></p> <p>_ is mitigated by :  <a href="#">SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</a></p> |

##### Input from Train CS System to TCCS Diagnostics: wrong monitoring and diagnostic data received

|                        |                                            |
|------------------------|--------------------------------------------|
| ID                     | SPRM-1629                                  |
| Failure Mode (Keyword) | Incorrect                                  |
| Failure Description    | Wrong monitoring/diagnostic data is given. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | A diagnosis is emitted based on wrong observations. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-6884 - Monitor+Store Train CS System asset state</p> <p>relates to :  SPMS-6909 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3194 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### Input from Train CS System to TCCS Diagnostics: monitoring and diagnostic data received too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1628                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Failure Description                | Monitoring/diagnostic data is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Linked Functions Systems | A late diagnosis is emitted. A potential dangerous behaviour is not detected. Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation with a dangerous behaviour.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Linked Work Items                  | <p>relates to :  SPMS-6884 - Monitor+Store Train CS System asset state</p> <p>relates to :  SPMS-6909 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3194 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### 2.2.1.2 Inputs for configuration

#### Input from Train CS System to TCCS Configuration: system state observation received too early

|                                       |                                                                                                                                                                                                                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                    | SPRM-2011                                                                                                                                                                                                             |
| Failure Mode<br>(Keyword)             | Commission                                                                                                                                                                                                            |
| Failure Description                   | State of configuration data is given too early or at a wrong time.                                                                                                                                                    |
| Effect on Linked<br>Functions Systems | The activation state is considered even though an earlier phase is the sequence (preloading for example) hasn't been completed. The current phase might stop.<br>The configuration data in itself might be corrupted. |
| Effect on Railway<br>System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                 |
| Risk Comment                          |                                                                                                                                                                                                                       |

|                   |                                                                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-7248 - <a href="#">Maintain Train CS System configuration data</a>                |
|                   | relates to :  SPMS-7251 - <a href="#">Activated state of configuration data</a>                      |
|                   | relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a>                 |
|                   | assesses :  SPRM-116 - <a href="#">[B.1.2] Failure to operate a train or rail vehicle</a>            |
|                   | assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a>                      |
|                   | assesses :  SPRM-274 - <a href="#">[B.2.2] Failure of the braking system</a>                         |
|                   | assesses :  SPRM-277 - <a href="#">[B.2.0] Other failures of the rolling stock</a>                   |
|                   | causes :  SPRM-71 - <a href="#">[A1] Collisions</a>                                                  |
|                   | causes :  SPRM-77 - <a href="#">[A2] Derailments</a>                                                 |
|                   | causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a>                                     |
|                   | causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a>      |
|                   | has parent :  SPRM-3210 - <a href="#">Inputs for configuration</a>                                   |
|                   | _ is mitigated by :  SPRM-3024 - <a href="#">TCCS system supports safety attestation process</a>    |
|                   | _ is mitigated by :  SPRM-3025 - <a href="#">Target system supports safety attestation process</a> |

### Input from Train CS System to TCCS Configuration: wrong system state observation received

|                                    |                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-2013                                                                                                                                                                            |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                            |
| Failure Description                | Wrong state of configuration data is given.                                                                                                                                          |
| Effect on Linked Functions Systems | A wrong activation state is considered for the current phase, leading to a wrong execution of next phases. The target system might be set in operation with potential safety issues. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items        | <p>relates to :  SPMS-7248 - Maintain Train CS System configuration data</p> <p>relates to :  SPMS-7251 - Activated state of configuration data</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3210 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> |

### Input from Train CS System to TCCS Configuration: system state observation received too late

|                                    |                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-2012                                                                                                       |
| Failure Mode (Keyword)             | Omission                                                                                                        |
| Failure Description                | State of configuration data is given too late or not at all.                                                    |
| Effect on Linked Functions Systems | The activation state is not given. The target system might be set in operation with an unchecked configuration. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items        | <p>relates to :  SPMS-7248 - Maintain Train CS System configuration data</p> <p>relates to :  SPMS-7251 - Activated state of configuration data</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3210 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3172 - Compatibility between dependent components</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> <p>_ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process</p> |

### 2.2.1.3 Outputs for configuration

#### Output of TCCS Configuration to Train CS system: configuration data state sent too early

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                       | SPRM-2854                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode<br>(Keyword)                | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Failure<br>Description                   | Configuration data is updated too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Linked<br>Functions<br>Systems | Non-Safety Related : 1) The system might be updated without consideration to operation schedule, but out of operation. Safety Related : 2) The system might be updated during operation. 3) The interface might overload with other requests/uploads. 4) A component of the system might be updated while other incompatible components are running. 5) A configuration with known safety issues is installed before the deployment has been stopped. |
| Effect on<br>Railway System              | Non-Safety Related : 1) Unavailability of one or more trains until the configuration is deployed. Safety Related : 2) Wrongly timed deactivation request might lead to a failure of more than one system during operation. 3) Failure of one of more system elements. 4) Incompatibility of components might lead to failures or wrong safety-related command. 5) A component might issue a wrong safety-relevant command.                            |
| Risk Comment                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                   |                                                                                                                                                                  |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-2834 - Maintain configuration data                           |
|                   | relates to :  SPMS-7250 - Configuration data                                    |
|                   | relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)            |
|                   | assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle       |
|                   | causes :  SPRM-71 - [A1] Collisions                                             |
|                   | causes :  SPRM-77 - [A2] Derailments                                            |
|                   | causes :  SPRM-81 - [A3] Level Crossing Accident                                |
|                   | causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion |
|                   | assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure                 |
|                   | assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock              |
|                   | assesses :  SPRM-274 - [B.2.2] Failure of the braking system                    |
|                   | has parent :  SPRM-3211 - Outputs for configuration                             |
|                   | _ is mitigated by : {C} SPRM-3023 - Safe update insurance                                                                                                        |
|                   | _ is mitigated by : {C} SPRM-3026 - Safety in case of configuration interface failures                                                                           |
|                   | _ is mitigated by : {C} SPRM-3172 - Compatibility between dependent components                                                                                   |
|                   | _ is mitigated by : {C} SPRM-3308 - Configuration obsolescence check                                                                                             |

### Output of TCCS Configuration to Train CS system: wrong configuration data state sent

|                                    |                                                                                                                                        |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-2856                                                                                                                              |
| Failure Mode (Keyword)             | Incorrect                                                                                                                              |
| Failure Description                | Wrong configuration data is loaded or correct configuration data is altered during transfer.                                           |
| Effect on Linked Functions Systems | 1) The target system is updated with wrong configuration data.<br>2) The wrong system is updated.                                      |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                       |
| Risk Comment                       | PRAM: the target system must not erase its current configuration until confirmation of deployment check. (To be checked for trackside) |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
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| Linked Work Items | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-7250 - Configuration data</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>has parent :  SPRM-3211 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3026 - Safety in case of configuration interface failures</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3298 - Availability requirement: Update installation out of operating time</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> <p>_ is mitigated by :  SPRM-3308 - Configuration obsolescence check</p> <p>_ is mitigated by :  SPRM-3671 - Availability requirement: Target system recovery in case of update failure</p> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Train CS system: configuration data state sent too late

|                        |           |
|------------------------|-----------|
| ID                     | SPRM-2855 |
| Failure Mode (Keyword) | Omission  |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Description                | Configuration data is updated too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Linked Functions Systems | The configuration data is not available, although the update process might have started.<br>The target system might continue to operate with an older version that contains safety relevant issues, or incompatibility with other systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Risk Comment                       | Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc). PRAM related:<br>A maximum delay of configuration deployment must be set by RU to minimise availability issues. Past this delay, the system must roll back to its previous configuration. In case of an additionnal failure during rollback, the system must stay out of operation until maintenance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-7250 - Configuration data</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3211 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.</p> <p>_ is mitigated by :  SPRM-3172 - Compatibility between dependent components</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> <p>_ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process</p> |

## 2.2.2 Traffic CS

### 2.2.2.1 Inputs for diagnostics

#### Input from Traffic CS System to TCCS Diagnostics: monitoring and diagnostic data received too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1618                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Failure Description                | Monitoring/diagnostic data is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Effect on Linked Functions Systems | No effect, as long as the state given corresponds to the current time (see incorrect failure mode if not).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Linked Work Items                  | <p>relates to :  <a href="#">SPMS-2895 - Monitor+Store Traffic CS System asset state</a></p> <p>relates to :  <a href="#">SPMS-3062 - Monitoring and diagnostic data</a></p> <p>relates to :  <a href="#">SPMS-6663 - Perform system asset diagnosis</a></p> <p>has parent :  <a href="#">SPRM-3195 - Inputs for diagnostics</a></p> <p>_ is mitigated by :  <a href="#">SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</a></p> |

#### Input from Traffic CS System to TCCS Diagnostics: wrong monitoring and diagnostic data received

|                        |                                            |
|------------------------|--------------------------------------------|
| ID                     | SPRM-1623                                  |
| Failure Mode (Keyword) | Incorrect                                  |
| Failure Description    | Wrong monitoring/diagnostic data is given. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | A diagnosis is emitted based on wrong data. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Linked Work Items                  | <p>relates to :  SPMS-2895 - Monitor+Store Traffic CS System asset state</p> <p>relates to :  SPMS-3062 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3195 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### Input from Traffic CS System to TCCS Diagnostics: monitoring and diagnostic data received too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1622                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Failure Description                | Monitoring/diagnostic data is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Effect on Linked Functions Systems | A late diagnosis is emitted. A potential dangerous behaviour is not detected. Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation with a dangerous behaviour.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Linked Work Items                  | <p>relates to :  SPMS-2895 - Monitor+Store Traffic CS System asset state</p> <p>relates to :  SPMS-3062 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3195 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### 2.2.2.2 Inputs for configuration

#### Input from Traffic CS System to TCCS Configuration: configuration data state received too early

|                                       |                                                                                                                                                                                                                       |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                    | SPRM-1647                                                                                                                                                                                                             |
| Failure Mode<br>(Keyword)             | Commission                                                                                                                                                                                                            |
| Failure Description                   | State of configuration data is given too early or at a wrong time.                                                                                                                                                    |
| Effect on Linked<br>Functions Systems | The activation state is considered even though an earlier phase is the sequence (preloading for example) hasn't been completed. The current phase might stop.<br>The configuration data in itself might be corrupted. |
| Effect on Railway<br>System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                 |
| Risk Comment                          |                                                                                                                                                                                                                       |

|                   |                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-2840 - Maintain Traffic CS System configuration data                                                          |
|                   | relates to :  SPMS-3211 - Activated state of configuration data                                                                  |
|                   | relates to :  SPMS-6991 - Activate configuration data (Main)                                                                     |
|                   | assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure                                                             |
|                   | assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure                                                                  |
|                   | assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure                                                  |
|                   | assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure                                                                      |
|                   | assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment                                                         |
|                   | assesses :  SPRM-301 - [B.3.1.0] Other failure of the track                                                                      |
|                   | assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)                                                   |
|                   | causes :  SPRM-71 - [A1] Collisions                                                                                              |
|                   | causes :  SPRM-77 - [A2] Derailments                                                                                             |
|                   | causes :  SPRM-81 - [A3] Level Crossing Accident                                                                                |
|                   | causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion                                                |
|                   | has parent :  SPRM-3209 - Inputs for configuration                                                                             |
|                   | _ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process                                               |
|                   | _ is mitigated by :  SPRM-3025 - Target system supports safety attestation process                                             |
|                   | _ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS. |
|                   | _ is mitigated by :  SPRM-3172 - Compatibility between dependent components                                                    |
|                   | _ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update                              |
|                   | _ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption                              |
|                   | _ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process                                                    |

### Input from Traffic CS System to TCCS Configuration: wrong configuration data state received

|                        |                                             |
|------------------------|---------------------------------------------|
| ID                     | SPRM-1649                                   |
| Failure Mode (Keyword) | Incorrect                                   |
| Failure Description    | Wrong state of configuration data is given. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | A wrong activation state is considered for the current phase, leading to a wrong execution of next phases. The target system might be set in operation with potential safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Linked Work Items                  | <p>relates to :  SPMS-2840 - Maintain Traffic CS System configuration data</p> <p>relates to :  SPMS-3211 - Activated state of configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>has parent :  SPRM-3209 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> |

### Input from Traffic CS System to TCCS Configuration: configuration data state received too late

|    |           |
|----|-----------|
| ID | SPRM-1648 |
|----|-----------|

|                                    |                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| Failure Mode (Keyword)             | Omission                                                                                                        |
| Failure Description                | State of configuration data is given too late or not at all.                                                    |
| Effect on Linked Functions Systems | The activation state is not given. The target system might be set in operation with an unchecked configuration. |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.           |
| Risk Comment                       |                                                                                                                 |

#### Linked Work Items

relates to :  SPMS-2840 - Maintain Traffic CS System configuration data

relates to :  SPMS-3211 - Activated state of configuration data

relates to :  SPMS-6991 - Activate configuration data (Main)

assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure

assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure

assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure

assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure

assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment

assesses :  SPRM-301 - [B.3.1.0] Other failure of the track

assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)

causes :  SPRM-71 - [A1] Collisions

causes :  SPRM-77 - [A2] Derailments

causes :  SPRM-81 - [A3] Level Crossing Accident

causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion

has parent :  SPRM-3209 - Inputs for configuration

\_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process

\_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process

\_ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.

\_ is mitigated by :  SPRM-3172 - Compatibility between dependent components

\_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update

\_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption

\_ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process

### 2.2.2.3 Outputs for configuration

#### Output of TCCS Configuration to Traffic CS System: configuration data sent too early

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                       | SPRM-1630                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode<br>(Keyword)                | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Failure<br>Description                   | Configuration data is updated too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Linked<br>Functions<br>Systems | Non-Safety Related : 1) The system might be updated without consideration to operation schedule, but out of operation. Safety Related : 2) The system might be updated during operation. 3) The interface might overload with other requests/uploads. 4) A component of the system might be updated while other incompatible components are running. 5) A configuration with known safety issues is installed before the deployment has been stopped. |
| Effect on<br>Railway System              | Non-Safety Related :<br>1) Unavailability of an area until the configuration is deployed. Possible delay of one of more trains due to speed restrictions.<br>Safety Related :<br>2) Wrongly timed update might lead to a failure of more than one system during operation.<br>3) Failure of one of more system elements.<br>4) Incompatibility of components might lead to failures or wrong safety-related command.                                  |
| Risk Comment                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                   |                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a>                                 |
|                   | relates to :  SPMS-2993 - <a href="#">Actual state of configuration data</a>                          |
|                   | relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a>                          |
|                   | causes :  SPRM-71 - <a href="#">[A1] Collisions</a>                                                   |
|                   | causes :  SPRM-77 - <a href="#">[A2] Derailments</a>                                                  |
|                   | causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a>                                      |
|                   | causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a>       |
|                   | assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a>                  |
|                   | assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a>                       |
|                   | assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a>                           |
|                   | assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a>        |
|                   | assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a>              |
|                   | assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a>       |
|                   | assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a>                           |
|                   | has parent :  SPRM-3196 - <a href="#">Outputs for configuration</a>                                  |
|                   | _ is mitigated by :  SPRM-3023 - <a href="#">Safe update insurance</a>                              |
|                   | _ is mitigated by :  SPRM-3026 - <a href="#">Safety in case of configuration interface failures</a> |
|                   | _ is mitigated by :  SPRM-3172 - <a href="#">Compatibility between dependent components</a>         |
|                   | _ is mitigated by :  SPRM-3308 - <a href="#">Configuration obsolescence check</a>                   |

### Output of TCCS Configuration to Traffic CS System: wrong configuration data sent

|                                    |                                                                                                                                        |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1636                                                                                                                              |
| Failure Mode (Keyword)             | Incorrect                                                                                                                              |
| Failure Description                | Wrong configuration data is loaded or correct configuration data is altered during transfer.                                           |
| Effect on Linked Functions Systems | 1) The target system is updated with wrong configuration data.<br>2) The wrong system is updated.                                      |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                       |
| Risk Comment                       | PRAM: the target system must not erase its current configuration until confirmation of deployment check. (To be checked for trackside) |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-2993 - Actual state of configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>has parent :  SPRM-3196 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3026 - Safety in case of configuration interface failures</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3308 - Configuration obsolescence check</p> <p>_ is mitigated by :  SPRM-3671 - Availability requirement: Target system recovery in case of update failure</p> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Traffic CS System: configuration data sent too late

|                        |           |
|------------------------|-----------|
| ID                     | SPRM-1635 |
| Failure Mode (Keyword) | Omission  |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Description                | Configuration data is updated too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Effect on Linked Functions Systems | The configuration data is not available, although the update process might have started.<br>The target system might continue to operate with an older version that contains safety relevant issues, or incompatibility with other systems.                                                                                                                                                                                                                                                                     |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                               |
| Risk Comment                       | PRAM-related considerations: TMS shall not replan movements impacting a train when no response from CCS system about the execution state of a requested revocation of the movement permission for this train was received. Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc). PRAM related: A maximum delay of configuration deployment must be set by IM to minimise availability issues. |

|                   |                                                                                                                                                                                                                   |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-2834 - Maintain configuration data                                                                            |
|                   | relates to :  SPMS-2993 - Actual state of configuration data                                                                     |
|                   | relates to :  SPMS-6991 - Activate configuration data (Main)                                                                     |
|                   | assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure                                                             |
|                   | assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure                                                                  |
|                   | assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure                                                  |
|                   | assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure                                                                      |
|                   | assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment                                                         |
|                   | assesses :  SPRM-301 - [B.3.1.0] Other failure of the track                                                                      |
|                   | assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)                                                   |
|                   | causes :  SPRM-71 - [A1] Collisions                                                                                              |
|                   | causes :  SPRM-77 - [A2] Derailments                                                                                             |
|                   | causes :  SPRM-81 - [A3] Level Crossing Accident                                                                                |
|                   | causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion                                                |
|                   | has parent :  SPRM-3196 - Outputs for configuration                                                                            |
|                   | _ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS. |
|                   | _ is mitigated by :  SPRM-3172 - Compatibility between dependent components                                                    |
|                   | _ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update                              |
|                   | _ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption                              |
|                   | _ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process                                                    |

## 2.2.3 Trackside Assets CS

### 2.2.3.1 Inputs for diagnostics

**Input from Trackside Assets CS System to TCCS Diagnostics: monitoring and diagnostic data received too early**

|                        |                                                                   |
|------------------------|-------------------------------------------------------------------|
| ID                     | SPRM-1620                                                         |
| Failure Mode (Keyword) | Commission                                                        |
| Failure Description    | Monitoring/diagnostic data is given too early or at a wrong time. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | No effect, as long as the state given corresponds to the current time (see incorrect failure mode if not).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Linked Work Items                  | <p>relates to :  SPMS-6533 - Monitor+Store Trackside Assets CS System asset state</p> <p>relates to :  SPMS-6561 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3197 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### Input from Trackside Assets CS System to TCCS Diagnostics: wrong monitoring and diagnostic data received

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1627                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Description                | Wrong monitoring/diagnostic data is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Effect on Linked Functions Systems | A diagnosis is emitted based on wrong observations. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-6533 - Monitor+Store Trackside Assets CS System asset state</p> <p>relates to :  SPMS-6561 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3197 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### Input from Trackside Assets CS System to TCCS Diagnostics: monitoring and diagnostic data received too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1626                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Failure Description                | Monitoring/diagnostic data is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Linked Functions Systems | A late diagnosis is emitted. A potential dangerous behaviour is not detected. Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation with a dangerous behaviour.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-6533 - Monitor+Store Trackside Assets CS System asset state</p> <p>relates to :  SPMS-6561 - Monitoring and diagnostic data</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3197 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### 2.2.3.2 Inputs for configuration

#### Input from Trackside Assets CS System to TCCS Configuration: system state observation received too early

|                                    |                                                                                                                                                                                                                    |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1979                                                                                                                                                                                                          |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                         |
| Failure Description                | State of target system is given too early or at a wrong time.                                                                                                                                                      |
| Effect on Linked Functions Systems | The activation state is considered even though an earlier phase is the sequence (preloading for example) hasn't been completed. The current phase might stop. The configuration data in itself might be corrupted. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Linked Work Items        | <p>relates to :  SPMS-6534 - <a href="#">Maintain Trackside Assets CS System configuration data</a></p> <p>relates to :  SPMS-6609 - <a href="#">Activated state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a></p> <p>assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a></p> <p>assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a></p> <p>assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a></p> <p>assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a></p> <p>assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a></p> <p>assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a></p> <p>causes :  SPRM-71 - <a href="#">[A1] Collisions</a></p> <p>causes :  SPRM-77 - <a href="#">[A2] Derailments</a></p> <p>causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a></p> <p>causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a></p> <p>has parent :  SPRM-3198 - <a href="#">Inputs for configuration</a></p> <p>_ is mitigated by :  SPRM-3024 - <a href="#">TCCS system supports safety attestation process</a></p> <p>_ is mitigated by :  SPRM-3025 - <a href="#">Target system supports safety attestation process</a></p> <p>_ is mitigated by :  SPRM-3172 - <a href="#">Compatibility between dependent components</a></p> <p>_ is mitigated by :  SPRM-3297 - <a href="#">Target safe system update-related deactivation in case of update</a></p> <p>_ is mitigated by :  SPRM-3301 - <a href="#">Target system follows update process phases without interruption</a></p> <p>_ is mitigated by :  SPRM-3646 - <a href="#">Sequenced configuration deployment process</a></p> |

### Input from Trackside Assets CS System to TCCS Configuration: wrong system state observation received

|    |           |
|----|-----------|
| ID | SPRM-2010 |
|----|-----------|

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Mode<br>(Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Failure Description                   | Wrong state of target system is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Linked<br>Functions Systems | A wrong activation state is considered for the current phase, leading to a wrong execution of next phases. The target system might be set in operation with potential safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Effect on Railway<br>System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Risk Comment                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                     | <p>relates to :  SPMS-6534 - Maintain Trackside Assets CS System configuration data</p> <p>relates to :  SPMS-6609 - Activated state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3198 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> |

**Input from Trackside Assets CS System to TCCS Configuration: system state observation received too late**

|                                    |                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-2009                                                                                                       |
| Failure Mode (Keyword)             | Omission                                                                                                        |
| Failure Description                | State of target system is given too late or not at all.                                                         |
| Effect on Linked Functions Systems | The activation state is not given. The target system might be set in operation with an unchecked configuration. |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.           |
| Risk Comment                       |                                                                                                                 |

#### Linked Work Items

relates to :  SPMS-6534 - Maintain Trackside Assets CS System configuration data

relates to :  SPMS-6609 - Activated state of configuration data

relates to :  SPMS-6991 - Activate configuration data (Main)

assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure

assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure

assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure

assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure

assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment

assesses :  SPRM-301 - [B.3.1.0] Other failure of the track

assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)

causes :  SPRM-71 - [A1] Collisions

causes :  SPRM-77 - [A2] Derailments

causes :  SPRM-81 - [A3] Level Crossing Accident

causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion

has parent :  SPRM-3198 - Inputs for configuration

\_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process

\_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process

\_ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.

\_ is mitigated by :  SPRM-3172 - Compatibility between dependent components

\_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update

\_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption

\_ is mitigated by :  SPRM-3646 - Sequenced configuration deployment process

### 2.2.3.3 Outputs for configuration

#### Output of TCCS Configuration to Trackside Assets CS System: configuration data sent too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1631                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Failure Description                | Configuration data is sent too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Linked Functions Systems | <p>Non-Safety Related : 1) The system might be updated without consideration to operation schedule, but out of operation. Safety Related : 2) The system might be updated during operation. 3) The interface might overload with other requests/uploads. 4) A component of the system might be updated while other incompatible components are running. 5) A configuration with known safety issues is installed before the deployment has been stopped.</p> |
| Effect on Railway System           | <p>Non-Safety Related :</p> <p>1) Unavailability of an area until the configuration is deployed. Possible delay of one of more trains due to speed restrictions.</p> <p>Safety Related :</p> <p>2) Wrongly timed update might lead to a failure of more than one system during operation.</p> <p>3) Failure of one of more system elements.</p> <p>4) Incompatibility of components might lead to failures or wrong safety-related command.</p>              |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                   |                                                                                                                                                                                        |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a>                                 |
|                   | relates to :  SPMS-6562 - <a href="#">Actual state of configuration data</a>                          |
|                   | relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a>                          |
|                   | causes :  SPRM-71 - <a href="#">[A1] Collisions</a>                                                   |
|                   | causes :  SPRM-77 - <a href="#">[A2] Derailments</a>                                                  |
|                   | causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a>                                      |
|                   | causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a>       |
|                   | assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a>                  |
|                   | assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a>                       |
|                   | assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a>                           |
|                   | assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a>        |
|                   | assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a>       |
|                   | assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a>                           |
|                   | assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a>             |
|                   | has parent :  SPRM-3223 - <a href="#">Outputs for configuration</a>                                 |
|                   | _ is mitigated by :  SPRM-3023 - <a href="#">Safe update insurance</a>                              |
|                   | _ is mitigated by :  SPRM-3026 - <a href="#">Safety in case of configuration interface failures</a> |
|                   | _ is mitigated by :  SPRM-3172 - <a href="#">Compatibility between dependent components</a>         |
|                   | _ is mitigated by :  SPRM-3308 - <a href="#">Configuration obsolescence check</a>                   |

## Output of TCCS Configuration to Trackside Assets CS System: wrong configuration data sent

|                                    |                                                                                                                                        |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1638                                                                                                                              |
| Failure Mode (Keyword)             | Incorrect                                                                                                                              |
| Failure Description                | Wrong configuration data is loaded or correct configuration data is altered during transfer.                                           |
| Effect on Linked Functions Systems | 1) The target system is updated with wrong configuration data.<br>2) The wrong system is updated.                                      |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                       |
| Risk Comment                       | PRAM: the target system must not erase its current configuration until confirmation of deployment check. (To be checked for trackside) |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-6562 - Actual state of configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>has parent :  SPRM-3223 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3026 - Safety in case of configuration interface failures</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> <p>_ is mitigated by :  SPRM-3308 - Configuration obsolescence check</p> <p>_ is mitigated by :  SPRM-3671 - Availability requirement: Target system recovery in case of update failure</p> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Trackside Assets CS System: configuration data sent too late

|                        |           |
|------------------------|-----------|
| ID                     | SPRM-1637 |
| Failure Mode (Keyword) | Omission  |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Description                | Configuration data is updated too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Effect on Linked Functions Systems | The configuration data is not available, although the update process might have started. The target system might continue to operate with an older version that contains safety relevant issues, or incompatibility with other systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Effect on Railway System           | One or more trains might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Risk Comment                       | Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a></p> <p>relates to :  SPMS-6562 - <a href="#">Actual state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a></p> <p>assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a></p> <p>assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a></p> <p>assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a></p> <p>assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a></p> <p>assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a></p> <p>assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a></p> <p>causes :  SPRM-71 - <a href="#">[A1] Collisions</a></p> <p>causes :  SPRM-77 - <a href="#">[A2] Derailments</a></p> <p>causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a></p> <p>causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a></p> <p>has parent :  SPRM-3223 - <a href="#">Outputs for configuration</a></p> <p>_ is mitigated by :  SPRM-3068 - <a href="#">TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.</a></p> <p>_ is mitigated by :  SPRM-3172 - <a href="#">Compatibility between dependent components</a></p> <p>_ is mitigated by :  SPRM-3297 - <a href="#">Target safe system update-related deactivation in case of update</a></p> <p>_ is mitigated by :  SPRM-3301 - <a href="#">Target system follows update process phases without interruption</a></p> <p>_ is mitigated by :  SPRM-3646 - <a href="#">Sequenced configuration deployment process</a></p> |

## 2.2.4 Asset Management System

### 2.2.4.1 Inputs for diagnostics

#### Input from Asset Management System to TCCS Diagnostics: logistic data received too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1619                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Failure Description                | Logistic data is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Linked Functions Systems | Logistic data from an earlier state than expected is used to evaluate the next maintenance step.<br>Wrong maintenance tasks are considered, leading to a false interpretation of the target system's current state.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Linked Work Items                  | <p>relates to :  <a href="#">SPMS-4503 - Plan maintenance tasks+Manage asset</a></p> <p>relates to :  <a href="#">SPMS-6555 - Logistic data</a></p> <p>relates to :  <a href="#">SPMS-6979 - Perform system asset diagnosis (logistic data)</a></p> <p>has parent :  <a href="#">SPRM-3199 - Inputs for diagnostics</a></p> <p>_ is mitigated by :  <a href="#">SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</a></p> |

#### Input from Asset Management System to TCCS Diagnostics: wrong logistic data received

|                                    |                                                                                                                          |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1658                                                                                                                |
| Failure Mode (Keyword)             | Incorrect                                                                                                                |
| Failure Description                | Wrong logistic data is given.                                                                                            |
| Effect on Linked Functions Systems | Wrong maintenance tasks are considered, leading to a false interpretation of the target system's current state.          |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis. |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Risk Comment      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Linked Work Items | <p>relates to :  SPMS-4503 - Plan maintenance tasks+Manage asset</p> <p>relates to :  SPMS-6555 - Logistic data</p> <p>relates to :  SPMS-6979 - Perform system asset diagnosis (logistic data)</p> <p>has parent :  SPRM-3199 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

### Input from Asset Management System to TCCS Diagnostics: logistic data received too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1657                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Failure Description                | Logistic data is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Effect on Linked Functions Systems | <p>The target is waiting for the logistic data to be sent. The system might consider an earlier state.</p> <p>Wrong maintenance tasks are considered, leading to a false interpretation of the target system's current state.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Linked Work Items                  | <p>relates to :  SPMS-4503 - Plan maintenance tasks+Manage asset</p> <p>relates to :  SPMS-6555 - Logistic data</p> <p>relates to :  SPMS-6979 - Perform system asset diagnosis (logistic data)</p> <p>has parent :  SPRM-3199 - Inputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3173 - Availability requirement: No restart/reboot in case of access to diagnostic data</p> |

## 2.2.4.2 Outputs for diagnostics

### Output of TCCS Diagnostics to Asset Management System: system asset state evaluation sent too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1596                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Failure Description                | System asset state is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Effect on Linked Functions Systems | <p>No effect, as long as the diagnosis is correct at the time it is sent (see incorrect failure mode if not).</p> <p>If multiple data are sent and one asset state is delayed, the diagnosis of the whole train on-board system or trackside asset system can't fully be determined. The timestamp won't be coherent with each other.</p> <p>A temporal incoherence on the data might lead to a wrong diagnosis.</p> <p>If data are sent too early, next to another set, this might lead to an overload of the interface.</p>                                                                                                                                                                                             |
| Effect on Railway System           | <p>No effect.</p> <p>Optimisation of maintenance will be altered : might lead to availability issues.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Linked Work Items                  | <p>relates to :  SPMS-5445</p> <p>relates to :  SPMS-4502 - Monitor+Evaluate system asset state</p> <p>relates to :  SPMS-4507 - Evaluated system asset state</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3200 - Outputs for diagnostics</p> |

### Output of TCCS Diagnostics to Asset Management System: wrong system asset state evaluation sent

|    |           |
|----|-----------|
| ID | SPRM-1598 |
|----|-----------|

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Failure Description                | Wrong system asset state is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Effect on Linked Functions Systems | A wrong diagnosis might affect the target system maintenance and/or restrictions. A wrong position might define maintenance operation on the wrong area. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                                                               |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.<br>The level of maintainability might increase.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Linked Work Items                  | <p>relates to :  SPMS-5445</p> <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-4507 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3200 - <a href="#">Outputs for diagnostics</a></p> |

### Output of TCCS Diagnostics to Asset Management System: system asset state evaluation sent too late

|                                    |                                                                                                                                                                                                                               |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1597                                                                                                                                                                                                                     |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                      |
| Failure Description                | System asset state is given too late or not at all.                                                                                                                                                                           |
| Effect on Linked Functions Systems | <p>The target might not be aware of events that might lead to failure of the system.</p> <p>Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation.</p> |
| Effect on Railway System           | <p>Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.</p> <p>The level of maintainability might increase.</p>                                           |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Risk Comment      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Linked Work Items | relates to :  SPMS-5445<br>relates to :  SPMS-4502 - Monitor+Evaluate system asset state<br>relates to :  SPMS-4507 - Evaluated system asset state<br>relates to :  SPMS-6663 - Perform system asset diagnosis<br>has parent :  SPRM-3200 - Outputs for diagnostics |

## 2.2.5 Data preparation

### 2.2.5.1 Inputs for configuration

**Input from Data Preparation to TCCS Configuration: signed configuration data received too early**

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1670                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Description                | Configuration data is provided/signed too early or a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Linked Functions Systems | The configuration data is available sooner than expected.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Linked Work Items                  | relates to :  SPMS-5395 - Provide+sign configuration data<br>relates to :  SPMS-6907 - Configuration data<br>relates to :  SPMS-6991 - Activate configuration data (Main)<br>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)<br>has parent :  SPRM-3220 - Inputs for configuration |

**Input from Data Preparation to TCCS Configuration: wrong signed configuration data received**

|                        |           |
|------------------------|-----------|
| ID                     | SPRM-1672 |
| Failure Mode (Keyword) | Incorrect |

|                                    |                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Description                | Wrong configuration data is provided and signed.                                                                                         |
| Effect on Linked Functions Systems | <p>A wrong configuration is set to be installed.</p> <p>A safety-relevant command might be issued based on wrong configuration data.</p> |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                    |
| Risk Comment                       | The supplier and the integrator shall be fully responsible for the coherence of the data.                                                |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-5395 - Provide+sign configuration data</p> <p>relates to :  SPMS-6907 - Configuration data</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3220 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3172 - Compatibility between dependent components</p> <p>_ is mitigated by :  SPRM-3308 - Configuration obsolescence check</p> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Input from Data Preparation to TCCS Configuration: signed configuration data received too late**

|    |           |
|----|-----------|
| ID | SPRM-1671 |
|----|-----------|

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Failure Description                | Configuration data is provided/signed too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Linked Functions Systems | <p>The configuration data is not available.</p> <p>The target system might continue to operate with an older version that contains safety relevant issues. It might need to be set out of operation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Railway System           | Unavailability of an area or train due to restrictions imposed by the IM/RU following the detection of safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Risk Comment                       | Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-5395 - <a href="#">Provide+sign configuration data</a></p> <p>relates to :  SPMS-6907 - <a href="#">Configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3220 - <a href="#">Inputs for configuration</a></p> |

## 2.2.6 Integrator

### 2.2.6.1 Inputs for configuration

#### Input from Integrator to TCCS Configuration: configuration data received too early

|                                    |                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1676                                                                                                                                                                                                        |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                       |
| Failure Description                | Configuration data is provided too early or a wrong time.                                                                                                                                                        |
| Effect on Linked Functions Systems | <p>1) The configuration data is available sooner than expected.</p> <p>The data from the supplier is not available at the start of the loading process.</p> <p>2) The data might be loaded during operation.</p> |

|                          |                                                                                                                                                                                                                                                                              |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | <p>1) No effect. The top-level configuration won't be deployed if the lower levels are not fully available.</p> <p>2) A wrongly timed deactivation/activation request might be issued, for example during train operation. This might lead to failures during operation.</p> |
| Risk Comment             |                                                                                                                                                                                                                                                                              |

Linked Work Items

relates to :  SPMS-6885 - Provide configuration data

relates to :  SPMS-6906 - Configuration data

relates to :  SPMS-6991 - Activate configuration data (Main)

relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)

assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure

assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle

assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure

assesses :  SPRM-274 - [B.2.2] Failure of the braking system

assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock

assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure

assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure

assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment

assesses :  SPRM-301 - [B.3.1.0] Other failure of the track

assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)

causes :  SPRM-71 - [A1] Collisions

causes :  SPRM-77 - [A2] Derailments

causes :  SPRM-81 - [A3] Level Crossing Accident

causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion

has parent :  SPRM-3217 - Inputs for configuration

\_ is mitigated by : {C} SPRM-3023 - Safe update insurance

\_ is mitigated by : {C} SPRM-3024 - TCCS system supports safety attestation process

\_ is mitigated by : {C} SPRM-3025 - Target system supports safety attestation process

\_ is mitigated by : {C} SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.

\_ is mitigated by : {C} SPRM-3172 - Compatibility between dependent components

\_ is mitigated by : {C} SPRM-3297 - Target safe system update-related deactivation in case of update

\_ is mitigated by : {C} SPRM-3308 - Configuration obsolescence check

**Input from Integrator to TCCS Configuration: wrong configuration data received**

|                                    |                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1678                                                                                                                                |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                |
| Failure Description                | Wrong configuration data is provided.                                                                                                    |
| Effect on Linked Functions Systems | <p>A wrong configuration is set to be installed.</p> <p>A safety-relevant command might be issued based on wrong configuration data.</p> |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                    |
| Risk Comment                       |                                                                                                                                          |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-6885 - Provide configuration data</p> <p>relates to :  SPMS-6906 - Configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3217 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input from Integrator to TCCS Configuration: configuration data received too late

|                        |                                                        |
|------------------------|--------------------------------------------------------|
| ID                     | SPRM-1677                                              |
| Failure Mode (Keyword) | Omission                                               |
| Failure Description    | Configuration data is provided too late or not at all. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | <p>The configuration data is not available.</p> <p>The system might continue to operate with an older version that contains safety relevant issues. It might need to be set out of operation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Effect on Railway System           | Unavailability of an area or train due to restrictions imposed by the IM/RU following the detection of safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Risk Comment                       | <p>Any safety issue identified in an obsolete* version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc).</p> <p>*obsolete here means a configuration not authorized anymore (because of a safety issue).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Linked Work Items                  | <p>relates to :  SPMS-6885 - <a href="#">Provide configuration data</a></p> <p>relates to :  SPMS-6906 - <a href="#">Configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3217 - <a href="#">Inputs for configuration</a></p> |

### Input from Integrator to TCCS Configuration: checked and signed configuration data received too early

|                                    |                                                                                                                                                                                              |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1664                                                                                                                                                                                    |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                   |
| Failure Description                | Configuration data is checked/signed too early or a wrong time.                                                                                                                              |
| Effect on Linked Functions Systems | <p>1) The configuration data is checked and signed without it being fully available. Then the check will be wrong.</p> <p>2) The check occurs while the data has been declared obsolete.</p> |
| Effect on Railway System           | <p>1) No effect. A wrong check will not authorize the deployment.</p> <p>2) An obsolete configuration is installed resulting in safety-relevant command being issued.</p>                    |
| Risk Comment                       |                                                                                                                                                                                              |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-6883 - <a href="#">Check+Sign configuration data</a></p> <p>relates to :  SPMS-6906 - <a href="#">Configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a></p> <p>assesses :  SPRM-116 - <a href="#">[B.1.2] Failure to operate a train or rail vehicle</a></p> <p>assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a></p> <p>assesses :  SPRM-274 - <a href="#">[B.2.2] Failure of the braking system</a></p> <p>assesses :  SPRM-277 - <a href="#">[B.2.0] Other failures of the rolling stock</a></p> <p>assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a></p> <p>assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a></p> <p>assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a></p> <p>assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a></p> <p>causes :  SPRM-71 - <a href="#">[A1] Collisions</a></p> <p>causes :  SPRM-77 - <a href="#">[A2] Derailments</a></p> <p>causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a></p> <p>causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a></p> <p>has parent :  SPRM-3217 - <a href="#">Inputs for configuration</a></p> <p>_ is mitigated by :  SPRM-3308 - <a href="#">Configuration obsolescence check</a></p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input from Integrator to TCCS Configuration: wrong checked and signed configuration data received

|                                    |                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1666                                                                                                                                |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                |
| Failure Description                | Wrong configuration data is checked/signed or correct configuration data is wrongly checked/signed.                                      |
| Effect on Linked Functions Systems | <p>A wrong configuration is set to be installed.</p> <p>A safety-relevant command might be issued based on wrong configuration data.</p> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Risk Comment             | The integrator shall be fully responsible for the coherence of the data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Linked Work Items        | <p>relates to :  SPMS-6883 - Check+Sign configuration data</p> <p>relates to :  SPMS-6906 - Configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3217 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> |

**Input from Integrator to TCCS Configuration: checked and signed configuration data received too late**

|    |           |
|----|-----------|
| ID | SPRM-1665 |
|----|-----------|

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Failure Description                | Configuration data is checked/signed too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Effect on Linked Functions Systems | <p>The configuration data is not available.</p> <p>The system might continue to operate with an older version that contains safety relevant issues. It might need to be set out of operation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Railway System           | Unavailability of an area or train due to restrictions imposed by the IM/RU following the detection of safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Risk Comment                       | <p>Any safety issue identified in an obsolete* version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc).</p> <p>*obsolete here means a configuration not authorized anymore (because of a safety issue).</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Linked Work Items                  | <p>relates to :  SPMS-6883 - <a href="#">Check+Sign configuration data</a></p> <p>relates to :  SPMS-6906 - <a href="#">Configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3217 - <a href="#">Inputs for configuration</a></p> |

## 2.2.7 Configuration Manager

### 2.2.7.1 Inputs for configuration

**Input from Configuration Manager to TCCS Configuration: configuration data state request received too early**

|                                    |                                                                                                                             |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1656                                                                                                                   |
| Failure Mode (Keyword)             | Commission                                                                                                                  |
| Failure Description                | Configuration data state request is sent too early or at a wrong time.                                                      |
| Effect on Linked Functions Systems | The configuration manager might get an unexpected state, but without any effect as this represents the current right state. |
| Effect on Railway System           | No effect.                                                                                                                  |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Risk Comment      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Linked Work Items | <p>relates to :  SPMS-5400 - Prepare+Supervise distribution of the configuration data</p> <p>relates to :  SPMS-5413 - Required state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3215 - Inputs for configuration</p> |

### Input from Configuration Manager to TCCS Configuration: wrong configuration data state request received

|                                    |                                                                                                                                                                        |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1660                                                                                                                                                              |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                              |
| Failure Description                | Wrong configuration data state request is sent.                                                                                                                        |
| Effect on Linked Functions Systems | The TCCS system might received a wrong request and might sent a wrong state. The configuration manager might stop the deployment, or allow a wrong deployment.         |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                  |
| Risk Comment                       | Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc). |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-5400 - Prepare+Supervise distribution of the configuration data</p> <p>relates to :  SPMS-5413 - Required state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3215 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input from Configuration Manager to TCCS Configuration: configuration data state request received too late

|                        |                                                                  |
|------------------------|------------------------------------------------------------------|
| ID                     | SPRM-1659                                                        |
| Failure Mode (Keyword) | Omission                                                         |
| Failure Description    | Configuration data state request is sent too late or not at all. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | The TCCS system might pursue the deployment process with the configuration manager awareness.<br>Without answer of the TCCS system, the configuration manager might stop the process.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | Unavailability of an area or train due to restrictions imposed by the IM/RU following the detection of safety issues.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Risk Comment                       | Any safety issue identified in an obsolete version of the configuration is taken care of by applying restrictions on the SuC (lower speed/unavailability of area/etc). PRAM related: A maximum delay of configuration deployment must be set by IM to minimise availability issues. PRAM-related considerations: TMS shall not replan movements impacting a train when no response from CCS system about the execution state of a requested revocation of the movement permission for this train was received.                                                                                                                                                                                                                                                                                          |
| Linked Work Items                  | <p>relates to :  SPMS-5400 - Prepare+Supervise distribution of the configuration data</p> <p>relates to :  SPMS-5413 - Required state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3215 - Inputs for configuration</p> |

### 2.2.7.2 Outputs for configuration

#### Output of TCCS Configuration to Configuration Manager: configuration data state sent too early

|                                    |                                                                                                                   |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1632                                                                                                         |
| Failure Mode (Keyword)             | Commission                                                                                                        |
| Failure Description                | Configuration data state is given too early or at a wrong time.                                                   |
| Effect on Linked Functions Systems | A configuration data state from an earlier point in time is considered for the feedback to configuration manager. |
| Effect on Railway System           | No effect.                                                                                                        |
| Risk Comment                       |                                                                                                                   |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a></p> <p>relates to :  SPMS-6901 - <a href="#">Actual state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3201 - <a href="#">Outputs for configuration</a></p> |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Configuration Manager: wrong configuration data state sent

|                                    |                                                                                                                                                                                |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1640                                                                                                                                                                      |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                      |
| Failure Description                | Wrong configuration data state is given.                                                                                                                                       |
| Effect on Linked Functions Systems | A wrong configuration state is considered by the configuration manager: the system might have a configuration deployment issue which the configuration manager isn't aware of. |
| Effect on Railway System           | A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                                                                          |
| Risk Comment                       |                                                                                                                                                                                |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-6901 - Actual state of configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>assesses :  SPRM-278 - [B.2.0.1] Wrong side signalling (on-board) failure</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>assesses :  SPRM-3051 - [RH-OPE-04] Incorrect configuration input or operating data</p> <p>has parent :  SPRM-3201 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3024 - TCCS system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3025 - Target system supports safety attestation process</p> <p>_ is mitigated by :  SPRM-3026 - Safety in case of configuration interface failures</p> <p>_ is mitigated by :  SPRM-3172 - Compatibility between dependent components</p> <p>_ is mitigated by :  SPRM-3301 - Target system follows update process phases without interruption</p> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Output of TCCS Configuration to Configuration Manager: configuration data state sent too late**

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1639                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Failure Description                | Configuration data state is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Linked Functions Systems | The configuration data state is not given, which might delay the next step in the process if the configuration manager stops the deployment.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Effect on Railway System           | Unavailability of an area or train.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a></p> <p>relates to :  SPMS-6901 - <a href="#">Actual state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3201 - <a href="#">Outputs for configuration</a></p> |

## 2.2.8 Signaller

### 2.2.8.1 Outputs for diagnostics

#### Output of TCCS Diagnostics to Signaller: system asset state evaluation sent too early

|                        |                                                           |
|------------------------|-----------------------------------------------------------|
| ID                     | SPRM-1602                                                 |
| Failure Mode (Keyword) | Commission                                                |
| Failure Description    | System asset state is given too early or at a wrong time. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | <p>No effect, as long as the diagnosis is correct at the time it is sent (see incorrect failure mode if not).</p> <p>If multiple data are sent and one asset state is delayed, the diagnosis of the whole train on-board system or trackside asset system can't fully be determined. The timestamp won't be coherent with each other.</p> <p>A temporal incoherence on the data might lead to a wrong diagnosis.</p> <p>If data are sent too early, next to another set, this might lead to an overload of the interface.</p>                                                                                                                                           |
| Effect on Railway System           | <p>No effect.</p> <p>Optimisation of maintenance will be altered : might lead to availability issues.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6556 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3202 - <a href="#">Outputs for diagnostics</a></p> |

### Output of TCCS Diagnostics to Signaller: wrong system asset state evaluation sent

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1604                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Failure Description                | Wrong system asset state is given.                                                                                                                                                                                                                                                                                                                                                                                                          |
| Effect on Linked Functions Systems | A wrong diagnosis might affect the target system maintenance and/or restrictions. A wrong position might define maintenance operation on the wrong area. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation. |
| Effect on Railway System           | <p>Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.</p> <p>The level of maintainability might increase.</p>                                                                                                                                                                                                                                                         |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Risk Comment      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Linked Work Items | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6556 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3202 - <a href="#">Outputs for diagnostics</a></p> |

### Output of TCCS Diagnostics to Signaller: system asset state evaluation sent too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1603                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Failure Description                | System asset state is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Linked Functions Systems | <p>The target might not be aware of events that might lead to failure of the system.</p> <p>Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Railway System           | <p>Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.</p> <p>The level of maintainability might increase.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6556 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3202 - <a href="#">Outputs for diagnostics</a></p> |

### 2.2.8.2 Outputs for configuration

#### Output of TCCS Configuration to Signaller: configuration data state sent too early

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| ID                     | SPRM-1633                                                       |
| Failure Mode (Keyword) | Commission                                                      |
| Failure Description    | Configuration data state is given too early or at a wrong time. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | An accurate state given too early would have no consequence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a></p> <p>relates to :  SPMS-6902 - <a href="#">Actual state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3203 - <a href="#">Outputs for configuration</a></p> |

### Output of TCCS Configuration to Signaller: wrong configuration data state sent

|                                    |                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1642                                                                                                                                                           |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                           |
| Failure Description                | Wrong configuration data state is given.                                                                                                                            |
| Effect on Linked Functions Systems | Operation might be performed based on wrong state of configuration data. The signaller might set the system into operation although the update hasn't be completed. |
| Effect on Railway System           | A train might move with wrong speed restriction/wrong movement authority/wrong system activated/etc.                                                                |
| Risk Comment                       |                                                                                                                                                                     |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a></p> <p>relates to :  SPMS-6902 - <a href="#">Actual state of configuration data</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a></p> <p>assesses :  SPRM-116 - <a href="#">[B.1.2] Failure to operate a train or rail vehicle</a></p> <p>assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a></p> <p>assesses :  SPRM-274 - <a href="#">[B.2.2] Failure of the braking system</a></p> <p>assesses :  SPRM-277 - <a href="#">[B.2.0] Other failures of the rolling stock</a></p> <p>assesses :  SPRM-278 - <a href="#">[B.2.0.1] Wrong side signalling (on-board) failure</a></p> <p>assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a></p> <p>assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a></p> <p>assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a></p> <p>assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a></p> <p>assesses :  SPRM-3051 - <a href="#">[RH-OPE-04] Incorrect configuration input or operating data</a></p> <p>assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a></p> <p>causes :  SPRM-71 - <a href="#">[A1] Collisions</a></p> <p>causes :  SPRM-77 - <a href="#">[A2] Derailments</a></p> <p>causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a></p> <p>causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a></p> <p>has parent :  SPRM-3203 - <a href="#">Outputs for configuration</a></p> <p>_ is mitigated by :  SPRM-3024 - <a href="#">TCCS system supports safety attestation process</a></p> <p>_ is mitigated by :  SPRM-3025 - <a href="#">Target system supports safety attestation process</a></p> <p>_ is mitigated by :  SPRM-3301 - <a href="#">Target system follows update process phases without interruption</a></p> |
|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Signaller: configuration data state sent too late

|                        |           |
|------------------------|-----------|
| ID                     | SPRM-1641 |
| Failure Mode (Keyword) | Omission  |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Description                | Configuration data state is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Effect on Linked Functions Systems | Operation might be delayed if the signaller is not informed about the completion of the update.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Effect on Railway System           | Unavailability of an area or train.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-6902 - Actual state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3203 - Outputs for configuration</p> |

## 2.2.9 Traffic Management System

### 2.2.9.1 Inputs for configuration

#### Input from Traffic Management System to TCCS Configuration: configuration data activation plan received too early

|                                    |                                                                                                                                                                                          |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1661                                                                                                                                                                                |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                               |
| Failure Description                | Activation plan is provided too early or at a wrong time.                                                                                                                                |
| Effect on Linked Functions Systems | <p>An activation plan considering data from a earlier point in time is considered for activation/deactivation phases.</p> <p>The target system might be deactivated at a wrong time.</p> |
| Effect on Railway System           | Deployment might occur during operation.                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                          |

|                   |                                                                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-5399 - Provide planned activation time                         |
|                   | relates to :  SPMS-5411 - Planned activation time                                 |
|                   | relates to :  SPMS-6991 - Activate configuration data (Main)                      |
|                   | assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure              |
|                   | assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle         |
|                   | assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure                   |
|                   | assesses :  SPRM-274 - [B.2.2] Failure of the braking system                      |
|                   | assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock                |
|                   | assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure   |
|                   | assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure                       |
|                   | assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment          |
|                   | assesses :  SPRM-301 - [B.3.1.0] Other failure of the track                       |
|                   | assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)   |
|                   | causes :  SPRM-71 - [A1] Collisions                                             |
|                   | causes :  SPRM-77 - [A2] Derailments                                            |
|                   | causes :  SPRM-81 - [A3] Level Crossing Accident                                |
|                   | causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion |
|                   | has parent :  SPRM-3216 - Inputs for configuration                              |
|                   | _ is mitigated by :  SPRM-3023 - Safe update insurance                          |

### Input from Traffic Management System to TCCS Configuration: wrong configuration data activation plan received

|                                    |                                                                                                 |
|------------------------------------|-------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1663                                                                                       |
| Failure Mode (Keyword)             | Incorrect                                                                                       |
| Failure Description                | Wrong activation plan is provided.                                                              |
| Effect on Linked Functions Systems | Wrong activation time is considered.<br>The target system might be deactivated at a wrong time. |
| Effect on Railway System           | Deployment might occur during operation.                                                        |
| Risk Comment                       |                                                                                                 |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-5399 - <a href="#">Provide planned activation time</a></p> <p>relates to :  SPMS-5411 - <a href="#">Planned activation time</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>assesses :  SPRM-109 - <a href="#">[B.1.1] Failure to operate the infrastructure</a></p> <p>assesses :  SPRM-116 - <a href="#">[B.1.2] Failure to operate a train or rail vehicle</a></p> <p>assesses :  SPRM-130 - <a href="#">[B.1.0] Other un-coded operation failure</a></p> <p>assesses :  SPRM-274 - <a href="#">[B.2.2] Failure of the braking system</a></p> <p>assesses :  SPRM-277 - <a href="#">[B.2.0] Other failures of the rolling stock</a></p> <p>assesses :  SPRM-297 - <a href="#">[B.3.1.3] Wrong side signalling (infrastructure) failure</a></p> <p>assesses :  SPRM-298 - <a href="#">[B.3.1.4] Point and crossing failure</a></p> <p>assesses :  SPRM-300 - <a href="#">[B.3.1.5] Failure of the level crossing equipment</a></p> <p>assesses :  SPRM-301 - <a href="#">[B.3.1.0] Other failure of the track</a></p> <p>assesses :  SPRM-314 - <a href="#">[B.3.0.2] Train detection equipment failure (trackside)</a></p> <p>causes :  SPRM-71 - <a href="#">[A1] Collisions</a></p> <p>causes :  SPRM-77 - <a href="#">[A2] Derailments</a></p> <p>causes :  SPRM-81 - <a href="#">[A3] Level Crossing Accident</a></p> <p>causes :  SPRM-87 - <a href="#">[A4] Accidents to persons involving rolling stock in motion</a></p> <p>has parent :  SPRM-3216 - <a href="#">Inputs for configuration</a></p> <p>_ is mitigated by :  SPRM-3023 - <a href="#">Safe update insurance</a></p> |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input from Traffic Management System to TCCS Configuration: configuration data activation plan received too late

|                                    |                                                                                                                                                                                               |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1662                                                                                                                                                                                     |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                      |
| Failure Description                | Activation plan is provided too late or not at all.                                                                                                                                           |
| Effect on Linked Functions Systems | <p>The TransversalCCS system keeps the latest activation plan which is based on activation time not up to date.</p> <p>The target system might be deactivated for update at a wrong time.</p> |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | Deployment might occur during operation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Linked Work Items        | <p>relates to :  SPMS-5399 - Provide planned activation time</p> <p>relates to :  SPMS-5411 - Planned activation time</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3216 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3023 - Safe update insurance</p> |

### 2.2.9.2 Outputs for configuration

#### Output of TCCS Configuration to Traffic Management System: configuration data state sent too early

|                        |                                                                 |
|------------------------|-----------------------------------------------------------------|
| ID                     | SPRM-1634                                                       |
| Failure Mode (Keyword) | Commission                                                      |
| Failure Description    | Configuration data state is given too early or at a wrong time. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | The configuration data state is given earlier than expected (before the update process is completed).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-6900 - Actual state of configuration data</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3204 - Outputs for configuration</p> |

### Output of TCCS Configuration to Traffic Management System: wrong configuration data state sent

|                                    |                                                                                                                                                                                      |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1646                                                                                                                                                                            |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                            |
| Failure Description                | Wrong configuration data state is given.                                                                                                                                             |
| Effect on Linked Functions Systems | <p>A wrong configuration data state is considered by TMS.</p> <p>TMS bases the planning of operational movements based on wrong availability of the system given by TCCS system.</p> |
| Effect on Railway System           | Conflicting movements are defined by TMS.                                                                                                                                            |
| Risk Comment                       |                                                                                                                                                                                      |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Linked Work Items | <p>relates to :  SPMS-2834 - Maintain configuration data</p> <p>relates to :  SPMS-6900 - Actual state of configuration data</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>relates to :  SPMS-6991 - Activate configuration data (Main)</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>has parent :  SPRM-3204 - Outputs for configuration</p> <p>_ is mitigated by :  SPRM-3068 - TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.</p> <p>_ is mitigated by :  SPRM-3131 - Fail-safe behaviour insurance in response to detected failures [to be deleted ?]</p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Configuration to Traffic Management System: configuration data state sent too late

|                                    |                                                                                                          |
|------------------------------------|----------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1643                                                                                                |
| Failure Mode (Keyword)             | Omission                                                                                                 |
| Failure Description                | Configuration data state is given too late or not at all.                                                |
| Effect on Linked Functions Systems | The configuration data state is not given. TMS is not informed of the availability of the target system. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | Unavailability of an area or a train.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Linked Work Items        | relates to :  SPMS-2834 - <a href="#">Maintain configuration data</a><br>relates to :  SPMS-6900 - <a href="#">Actual state of configuration data</a><br>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a><br>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a><br>has parent :  SPRM-3204 - <a href="#">Outputs for configuration</a> |

## 2.2.10 Infrastructure Manager

### 2.2.10.1 Outputs for diagnostics

**Output of TCCS Diagnostics to Infrastructure Manager: system asset state evaluation sent too early**

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1608                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Failure Description                | System asset state is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Effect on Linked Functions Systems | No effect, as long as the diagnosis is correct at the time it is sent (see incorrect failure mode if not).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Linked Work Items                  | relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a><br>relates to :  SPMS-6558 - <a href="#">Evaluated system asset state</a><br>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a><br>has parent :  SPRM-3205 - <a href="#">Outputs for diagnostics</a> |

**Output of TCCS Diagnostics to Infrastructure Manager: wrong system asset state evaluation sent**

|    |           |
|----|-----------|
| ID | SPRM-1610 |
|----|-----------|

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failure Description                | Wrong system asset state is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Effect on Linked Functions Systems | A wrong diagnosis might affect the target system maintenance and/or restrictions. A wrong position might define maintenance operation on the wrong area. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                             |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.<br>The level of maintainability might increase.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6558 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3205 - <a href="#">Outputs for diagnostics</a></p> |

### Output of TCCS Diagnostics to Infrastructure Manager: system asset state evaluation sent too late

|                                    |                                                                                                                                                                                                                                            |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1609                                                                                                                                                                                                                                  |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                   |
| Failure Description                | System asset state is given too late or not at all.                                                                                                                                                                                        |
| Effect on Linked Functions Systems | The target might not be aware of events that might lead to failure of the system. Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation with a dangerous behaviour. |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.<br>The level of maintainability might increase.                                                                   |
| Risk Comment                       |                                                                                                                                                                                                                                            |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  <a href="#">SPMS-4502 - Monitor+Evaluate system asset state</a></p> <p>relates to :  <a href="#">SPMS-6558 - Evaluated system asset state</a></p> <p>relates to :  <a href="#">SPMS-6663 - Perform system asset diagnosis</a></p> <p>has parent :  <a href="#">SPRM-3205 - Outputs for diagnostics</a></p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 2.2.11 Railway Undertaking

### 2.2.11.1 Outputs for diagnostics

**Output of TCCS Diagnostics to Railway Undertaking: system asset state evaluation sent too early**

|                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                    | SPRM-1611                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Failure Mode<br>(Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Failure Description                   | System asset state is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Effect on Linked<br>Functions Systems | <p>No effect, as long as the diagnosis is correct at the time it is sent (see incorrect failure mode if not).</p> <p>If multiple data are sent and one asset state is delayed, the diagnosis of the whole train on-board system or trackside asset system can't fully be determined. The timestamp won't be coherent with each other.</p> <p>A temporal incoherence on the data might lead to a wrong diagnosis.</p> <p>If data are sent too early, next to another set, this might lead to an overload of the interface.</p> |
| Effect on Railway<br>System           | <p>No effect.</p> <p>Optimisation of maintenance will be altered : might lead to availability issues.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Risk Comment                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6559 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3206 - <a href="#">Outputs for diagnostics</a></p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Output of TCCS Diagnostics to Railway Undertaking: wrong system asset state evaluation sent

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1613                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Failure Description                | Wrong system asset state is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Effect on Linked Functions Systems | A wrong diagnosis might affect the BuildingBlock maintenance and/or restrictions. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                    |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6559 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3206 - <a href="#">Outputs for diagnostics</a></p> |

### Output of TCCS Diagnostics to Railway Undertaking: system asset state evaluation sent too late

|                        |                                                     |
|------------------------|-----------------------------------------------------|
| ID                     | SPRM-1612                                           |
| Failure Mode (Keyword) | Omission                                            |
| Failure Description    | System asset state is given too late or not at all. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | The target might not be aware of events that might lead to failure of the system.<br>Restrictions and/or maintenance might be issued too late, resulting in failure due to the target system staying in operation with a dangerous behaviour.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | Unavailability of an area or train due to an unexpected failure or a wrong restriction of a system with wrong diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - <a href="#">Monitor+Evaluate system asset state</a></p> <p>relates to :  SPMS-6559 - <a href="#">Evaluated system asset state</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3206 - <a href="#">Outputs for diagnostics</a></p> |

### 2.2.11.2 Inputs for configuration

**Input from Railway Undertaking IT System to TCCS Configuration: configuration data activation plan received too early**

|                                    |                                                                                                                                                                                                     |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1679                                                                                                                                                                                           |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                          |
| Failure Description                | Activation plan is provided too early or at a wrong time.                                                                                                                                           |
| Effect on Linked Functions Systems | <p>An activation plan considering data from a earlier point in time is considered for activation/deactivation phases.</p> <p>The target system might be deactivated for update at a wrong time.</p> |
| Effect on Railway System           | <p>Deployment might occur during operation.</p> <p>A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.</p>                                        |
| Risk Comment                       |                                                                                                                                                                                                     |

|                   |                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | relates to :  SPMS-6886 - Provide planned activation time for vehicle                               |
|                   | relates to :  SPMS-6910 - Planned activation time                                                   |
|                   | relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)                                |
|                   | assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure                                |
|                   | assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle                           |
|                   | assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure                                     |
|                   | assesses :  SPRM-274 - [B.2.2] Failure of the braking system                                        |
|                   | assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock                                  |
|                   | assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure                     |
|                   | assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure                                         |
|                   | assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment                            |
|                   | assesses :  SPRM-301 - [B.3.1.0] Other failure of the track                                         |
|                   | assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)                     |
|                   | causes :  SPRM-71 - [A1] Collisions                                                               |
|                   | causes :  SPRM-77 - [A2] Derailments                                                              |
|                   | causes :  SPRM-81 - [A3] Level Crossing Accident                                                  |
|                   | causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion                   |
|                   | has parent :  SPRM-3222 - Inputs for configuration                                                |
|                   | _ is mitigated by :  SPRM-3023 - Safe update insurance                                            |
|                   | _ is mitigated by :  SPRM-3172 - Compatibility between dependent components                       |
|                   | _ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update |

### Input from Railway Undertaking IT System to TCCS Configuration: wrong configuration data activation plan received

|                                    |                                                                                                            |
|------------------------------------|------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1681                                                                                                  |
| Failure Mode (Keyword)             | Incorrect                                                                                                  |
| Failure Description                | Wrong activation plan is provided.                                                                         |
| Effect on Linked Functions Systems | Wrong activation time is considered.<br>The target system might be deactivated for update at a wrong time. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | <p>Deployment might occur during operation.</p> <p>A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Linked Work Items        | <p>relates to :  SPMS-6886 - Provide planned activation time for vehicle</p> <p>relates to :  SPMS-6910 - Planned activation time</p> <p>relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)</p> <p>assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure</p> <p>assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle</p> <p>assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure</p> <p>assesses :  SPRM-274 - [B.2.2] Failure of the braking system</p> <p>assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock</p> <p>assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure</p> <p>assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure</p> <p>assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment</p> <p>assesses :  SPRM-301 - [B.3.1.0] Other failure of the track</p> <p>assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)</p> <p>causes :  SPRM-71 - [A1] Collisions</p> <p>causes :  SPRM-77 - [A2] Derailments</p> <p>causes :  SPRM-81 - [A3] Level Crossing Accident</p> <p>causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion</p> <p>has parent :  SPRM-3222 - Inputs for configuration</p> <p>_ is mitigated by :  SPRM-3023 - Safe update insurance</p> <p>_ is mitigated by :  SPRM-3172 - Compatibility between dependent components</p> <p>_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update</p> |

**Input from Railway Undertaking IT System to TCCS Configuration: configuration data activation plan received too late**

|                                    |                                                                                                                                                                     |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1680                                                                                                                                                           |
| Failure Mode (Keyword)             | Omission                                                                                                                                                            |
| Failure Description                | Activation plan is provided too late or not at all.                                                                                                                 |
| Effect on Linked Functions Systems | The system keeps the latest activation plan which is based on activation time not up to date.<br>The target system might be deactivated for update at a wrong time. |
| Effect on Railway System           | Deployment might occur during operation.<br>A train might move with wrong speed restrictions/wrong movement authority/wrong system activated/etc.                   |
| Risk Comment                       |                                                                                                                                                                     |

Linked Work Items

relates to :  SPMS-6886 - Provide planned activation time for vehicle

relates to :  SPMS-6910 - Planned activation time

relates to :  SPMS-7210 - Activate configuration data (Vehicle Data)

assesses :  SPRM-109 - [B.1.1] Failure to operate the infrastructure

assesses :  SPRM-116 - [B.1.2] Failure to operate a train or rail vehicle

assesses :  SPRM-130 - [B.1.0] Other un-coded operation failure

assesses :  SPRM-274 - [B.2.2] Failure of the braking system

assesses :  SPRM-277 - [B.2.0] Other failures of the rolling stock

assesses :  SPRM-297 - [B.3.1.3] Wrong side signalling (infrastructure) failure

assesses :  SPRM-298 - [B.3.1.4] Point and crossing failure

assesses :  SPRM-300 - [B.3.1.5] Failure of the level crossing equipment

assesses :  SPRM-301 - [B.3.1.0] Other failure of the track

assesses :  SPRM-314 - [B.3.0.2] Train detection equipment failure (trackside)

causes :  SPRM-71 - [A1] Collisions

causes :  SPRM-77 - [A2] Derailments

causes :  SPRM-81 - [A3] Level Crossing Accident

causes :  SPRM-87 - [A4] Accidents to persons involving rolling stock in motion

has parent :  SPRM-3222 - Inputs for configuration

\_ is mitigated by :  SPRM-3023 - Safe update insurance

\_ is mitigated by :  SPRM-3172 - Compatibility between dependent components

\_ is mitigated by :  SPRM-3297 - Target safe system update-related deactivation in case of update

## 2.2.12 Field Force

### 2.2.12.1 Outputs for diagnostics

#### Output of TCCS Diagnostics to Field Force (maintainer): system asset state evaluation sent too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1614                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Failure Description                | System asset state is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Linked Functions Systems | No effect, as long as the diagnosis is correct at the time it is sent (see incorrect failure mode if not).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Risk Comment                       | Diagnostic data observed during maintenance shall be flagged with "maintenance mode" not to influence diagnosis performed by other parties.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - Monitor+Evaluate system asset state</p> <p>relates to :  SPMS-6560 - Evaluated system asset state</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3207 - Outputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3299 - Availability requirement: Target system maintenance mode information must be available</p> <p>_ is mitigated by :  SPRM-3300 - Availability requirement: TCCS system supports maintenance mode diagnostic</p> |

#### Output of TCCS Diagnostics to Field Force (maintainer): wrong system asset state evaluation sent

|                        |                                    |
|------------------------|------------------------------------|
| ID                     | SPRM-1616                          |
| Failure Mode (Keyword) | Incorrect                          |
| Failure Description    | Wrong system asset state is given. |

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Linked Functions Systems | A wrong diagnosis might affect the BuildingBlock maintenance and/or restrictions. If the diagnosis is more restrictive than the current asset state, a wrong restriction might be imposed and/or earlier maintenance operation might be planned. If the diagnosis is less restrictive than the current asset state, the target system might fail out of expectation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | Unavailability of an area or train due not solving the issue reported by the diagnosis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Risk Comment                       | Diagnostic data observed during maintenance shall be flagged with "maintenance mode" not to influence diagnosis performed by other parties.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Linked Work Items                  | <p>relates to :  SPMS-4502 - Monitor+Evaluate system asset state</p> <p>relates to :  SPMS-6560 - Evaluated system asset state</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3207 - Outputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3299 - Availability requirement: Target system maintenance mode information must be available</p> <p>_ is mitigated by :  SPRM-3300 - Availability requirement: TCCS system supports maintenance mode diagnostic</p> |

### Output of TCCS Diagnostics to Field Force (maintainer): system asset state evaluation sent too late

|                                    |                                                                                                                                                                                                       |
|------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1615                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                              |
| Failure Description                | System asset state is given too late or not at all.                                                                                                                                                   |
| Effect on Linked Functions Systems | <p>The target might not be aware of events that might lead to failure of the system.</p> <p>Unavailability of diagnostic data might not allow the maintainer to set the system back in operation.</p> |
| Effect on Railway System           | Unavailability of an area or train due not solving the issue reported by the diagnosis.                                                                                                               |
| Risk Comment                       | Diagnostic data observed during maintenance shall be flagged with "maintenance mode" not to influence diagnosis performed by other parties.                                                           |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-4502 - Monitor+Evaluate system asset state</p> <p>relates to :  SPMS-6560 - Evaluated system asset state</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3207 - Outputs for diagnostics</p> <p>_ is mitigated by :  SPRM-3299 - Availability requirement: Target system maintenance mode information must be available</p> <p>_ is mitigated by :  SPRM-3300 - Availability requirement: TCCS system supports maintenance mode diagnostic</p> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 2.2.13 Time related exchanges

### 2.2.13.1 Inputs for diagnostics

#### Input to TCCS Diagnostics: Time reference received too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1617                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Failure Description                | Time reference is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Effect on Linked Functions Systems | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - Provide current time</p> <p>relates to :  SPMS-4506 - Provided current time</p> <p>relates to :  SPMS-6663 - Perform system asset diagnosis</p> <p>has parent :  SPRM-3208 - Inputs for diagnostics</p> |

#### Input to TCCS Diagnostics: wrong Time reference received

|                                    |                                                                     |
|------------------------------------|---------------------------------------------------------------------|
| ID                                 | SPRM-1625                                                           |
| Failure Mode (Keyword)             | Incorrect                                                           |
| Failure Description                | Incorrect time reference is given.                                  |
| Effect on Linked Functions Systems | Result in commission/omission failure modes for targeted functions. |

|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Effect on Railway System | Result in commission/omission failure modes for targeted functions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Risk Comment             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Linked Work Items        | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-4506 - <a href="#">Provided current time</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3208 - <a href="#">Inputs for diagnostics</a></p> |

### Input to TCCS Diagnostics: Time reference received too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1624                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Failure Description                | Time reference is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Effect on Linked Functions Systems | Late or no execution of the targeted function as it takes the time variable into account.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Effect on Railway System           | Unavaibility of an area or a train.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-4506 - <a href="#">Provided current time</a></p> <p>relates to :  SPMS-6663 - <a href="#">Perform system asset diagnosis</a></p> <p>has parent :  SPRM-3208 - <a href="#">Inputs for diagnostics</a></p> |

### 2.2.13.2 Inputs for time synchronization

#### Input to TCCS time synchronisation: Time Reference sent too early

|                                    |                                                       |
|------------------------------------|-------------------------------------------------------|
| ID                                 | SPRM-1650                                             |
| Failure Mode (Keyword)             | Commission                                            |
| Failure Description                | Time reference is given too early or at a wrong time. |
| Effect on Linked Functions Systems | No effect.                                            |
| Effect on Railway System           | No effect.                                            |
| Risk Comment                       |                                                       |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-6271 - <a href="#">Provide current time</a></p> <p>has parent :  SPRM-3212 - <a href="#">Inputs for time synchronization</a></p> |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input to TCCS time synchronisation: wrong Time Reference received

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1652                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Incorrect                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Description                | Incorrect time reference is given.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Effect on Linked Functions Systems | Result in commission/omission failure modes for targeted functions.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Effect on Railway System           | Result in commission/omission failure modes for targeted functions.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-6271 - <a href="#">Provide current time</a></p> <p>has parent :  SPRM-3212 - <a href="#">Inputs for time synchronization</a></p> |

### Input to TCCS time synchronisation: Time Reference sent too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1651                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Failure Description                | Time reference is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Linked Functions Systems | Late or no execution of the targeted function as it takes the time variable into account.                                                                                                                                                                                                                                                                                                                                                                                             |
| Effect on Railway System           | Unavailability of an area or a train.                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-6271 - <a href="#">Provide current time</a></p> <p>has parent :  SPRM-3212 - <a href="#">Inputs for time synchronization</a></p> |

### 2.2.13.3 Inputs for configuration

#### Input to TCCS Configuration: Time Reference sent too early

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1653                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Failure Mode (Keyword)             | Commission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Failure Description                | Time reference is given too early or at a wrong time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Effect on Linked Functions Systems | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Effect on Railway System           | No effect.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-5412 - <a href="#">Provided current time</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3213 - <a href="#">Inputs for configuration</a></p> |

#### Input to TCCS Configuration: wrong Time Reference received

|                                    |                                                                     |
|------------------------------------|---------------------------------------------------------------------|
| ID                                 | SPRM-1655                                                           |
| Failure Mode (Keyword)             | Incorrect                                                           |
| Failure Description                | Incorrect time reference is given.                                  |
| Effect on Linked Functions Systems | Result in commission/omission failure modes for targeted functions. |
| Effect on Railway System           | Result in commission/omission failure modes for targeted functions. |
| Risk Comment                       |                                                                     |

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Linked Work Items | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-5412 - <a href="#">Provided current time</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3213 - <a href="#">Inputs for configuration</a></p> |
|-------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Input to TCCS Configuration: Time Reference sent too late

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ID                                 | SPRM-1654                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Failure Mode (Keyword)             | Omission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Failure Description                | Time reference is given too late or not at all.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Effect on Linked Functions Systems | Late or no execution of the targeted function as it takes the time variable into account.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Effect on Railway System           | Unavailability of an area or a train.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Risk Comment                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Linked Work Items                  | <p>relates to :  SPMS-6269 - <a href="#">Provide current time</a></p> <p>relates to :  SPMS-5412 - <a href="#">Provided current time</a></p> <p>relates to :  SPMS-6991 - <a href="#">Activate configuration data (Main)</a></p> <p>relates to :  SPMS-7210 - <a href="#">Activate configuration data (Vehicle Data)</a></p> <p>has parent :  SPRM-3213 - <a href="#">Inputs for configuration</a></p> |

## 3 Safety requirements derived from the analysis

### 3.1 Internal constraints (to be covered by Transversal CCS system)

These constraints shall be covered at System Level 5, and are addressed to CONEMP domain.

#### TCCS system supports safety attestation process

Configuration data integrity and correct configuration target must be checked before going back into operation (safety attestation process).

#### Compatibility between dependent components

TCCS system shall ensure that the target and all its dependencies are compatible before going back into operation.

#### **Configuration obsolescence check**

TCCS system shall support a means to prevent installing an obsolete configuration with known safety issues.

#### **Sequenced configuration deployment process**

TCCS system shall ensure that the configuration installation check occurs after installation.

### **3.2 Exported constraints**

#### **Safety in case of configuration interface failures**

The target safe system must ensure its own safety for any failure caused by configuration interface issues.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

#### **Safe update insurance**

The target safe system must ensure that any request for update doesn't interfere with safe operation.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

#### **Target system supports safety attestation process**

The target system must not go into operation until confirmation of data integrity and correct target (safety attestation process).

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

#### **TrafficCS system shall handle any safety issue resulting from wrong movements defined by TMS.**

Any movement resulting in possible safety issue (e.g.: collision) is taken care of by TrafficCS system.

*Addressed to: Traffic CS, Trackside Assets CS*

#### **Target safe system update-related deactivation in case of update**

The target safe system must not be able to execute any safe operation command related to data affected by an update during the update's activation.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

#### **Target system follows update process phases without interruption**

The target system must not allow any interruption while the current sequence of the update process has not been completed (except preloading as long as it doesn't interfere with safe operation).

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

**All these requirements concern the configuration part of the TCCS System. Thus, the risk analysis at System Level 5 shall only focus on Service Function Configuration.**

## 4 Non-safety requirements

### **Availability requirement: TCCS system supports maintenance mode diagnostic**

TCCS system shall flag any diagnostic data obtained during maintenance mode if available in the target system to differentiate them from operation diagnostic data.

*Addressed to: CONEMP*

### **Availability requirement: Update installation out of operating time**

TCCS system shall take planned operating time into consideration to install an update outside of operation.

*Addressed to: CONEMP*

### **Availability requirement: No restart/reboot in case of access to diagnostic data**

Any access to diagnostic data of the system shall not set it out of operation.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

### **Availability requirement: Target system maintenance mode information must be available**

The target system shall make its operating mode (in operation/in maintenance) available for diagnostic.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*

### **Availability requirement: Target system recovery in case of update failure**

The target system shall be able to go back to a previously validated configuration in case of configuration update failure.

*Addressed to: Train CS, Traffic CS, Trackside Assets CS*